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Indian Standard

SPECIFICATION FOR PLAIN WASHERS

(First Revision)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 LAKSHMI NARAYAN MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR PLAIN WASHERS

(First Revision)

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Indian Standard
SPECIFICATION FOR
PLAIN WASHERS
(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 9 November 1967, after the draft finalized by the Screw Threads and Fasteners Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 This standard was originally issued in 1962. This revision incorporates the decision taken by the ISO/TC 2 Bolts, Nuts and Accessories.

0.3 This standard is based on:

Draft ISO Recommendation No. 940 Washers for hexagon bolts and nuts, metric series. International Organization for Standardization.

Doc: ISO/TC 2 (Secretariat-184) 302 First draft proposal for washers for hexagon bolts and nuts — metric series — 42 up to and including 150 mm thread diameter. International Organization for Standardization.

Doc: ISO/TC 2 (Secretariat-194) 326 First draft proposal for washers for cheese head screws — metric series — 1 up to and including 20 mm thread diameter. International Organization for Standardization.

DIN 125-1943 Scheiben für Sechskantschrauben und Muttern (Washers for hexagon bolts and nuts). Deutscher Normenausschuss.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

* Rules for rounding off numerical values (revised).

1. SCOPE

1.1 This standard lays down the requirements for plain washers of the following types:

- a) Machined washers, for precision and semi-precision grade of general purpose bolts and screws, in the diameter range 1.7 to 155 mm;
- b) Punched washers, type A, for black grade general purpose bolts and screws, in the diameter range 1.8 to 52 mm; and
- c) Punched washers, type B, for slotted head screws in the diameter range 1.8 to 22 mm.

2. MANUFACTURE

2.1 Material — Washers shall be made of steel, brass, aluminium or any other suitable metal specified by the purchaser.

2.2 Workmanship — The washers shall be free from cracks, burrs, pits and other defects. The holes shall be reasonably concentric with the outer periphery. All sharp edges shall be removed.

3. DESIGNATION

3.1 A washer shall be designated by name, type, size, number of this standard and material.

Examples:

- a) A machined washer of size 10.5 mm made of brass shall be designated as:

Machined Washer 10.5 IS : 2016-Brass

- b) A punched washer, Type B of size 14 mm made of brass shall be designated as:

Punched Washer B14 IS : 2016-Brass

4. DIMENSIONS

4.1 The dimensions for machined washers, punched washers, types A and B, shall be as given in Tables 1, 2 and 3 respectively (see P 6 to 11). These tables also give the size of bolt or screw for which the washers are suitable.

4.2 The other dimensional requirements for punched washers covered in Tables 2 and 3 shall be as given in IS : 5369-1969*.

*General requirements for plain washers and lock washers.

5. FINISH

5.1 The plain washers shall be supplied in natural finish unless otherwise specified by the purchaser. At the request of the purchaser, washers may be phosphate coated, nickel plated, tinned, galvanized, copper plated, cadmium plated, etc. The properties of the plain washers shall not, however, be impaired by the protective coating specified by the purchaser.

6. PACKING

6.1 The plain washers may be packed as recommended below:

Sizes up to 10.5 mm	In boxes of 1 000 pieces
Sizes from 13 to 19 mm	In boxes of 500 pieces
Sizes 21 mm and above	In boxes of 100 pieces.

The plain washers may also be packed in quantities of 2 kg and 50 kg.

7. MARKING

7.1 The packages containing washers shall be marked with the size and manufacturer's name or trade-mark.

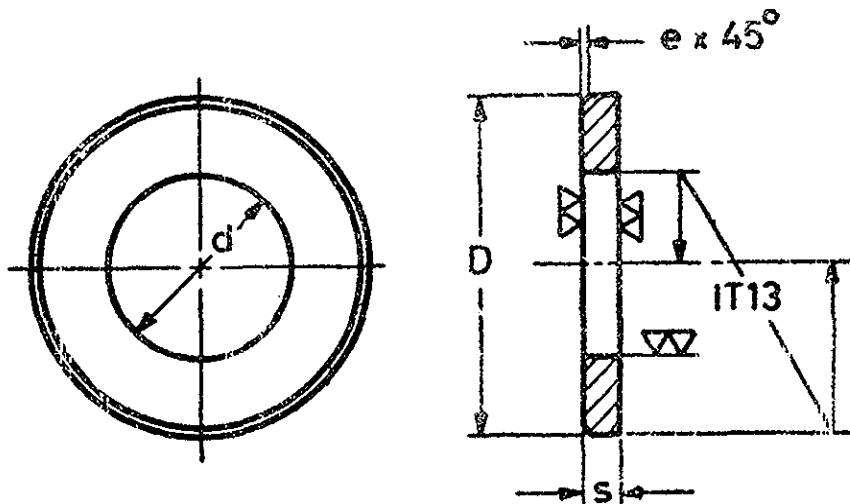
7.1.1 The packages may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

TABLE 1 DIMENSIONS FOR MACHINED WASHERS

(Clause 4.1)

All dimensions in millimetres.



SIZE <i>d</i> H12*	<i>D</i>		<i>s</i>		<i>e</i> <i>Nom</i>	FOR BOLT OR SCREW SIZE
	Basic	Tol	Basic	Tol		
1.7	4	$\begin{smallmatrix} +0 \\ -0.3 \end{smallmatrix}$	0.3	± 0.1	0.1	M1.6
(2)	5	$\begin{smallmatrix} +0 \\ -0.3 \end{smallmatrix}$	0.3	± 0.1	0.1	(M1.8)
2.2	5	$\begin{smallmatrix} +0 \\ -0.3 \end{smallmatrix}$	0.3	± 0.1	0.1	M2
(2.4)	6	$\begin{smallmatrix} +0 \\ -0.3 \end{smallmatrix}$	0.5	± 0.1	0.2	(M2.2)
2.7	6.5	$\begin{smallmatrix} +0 \\ -0.3 \end{smallmatrix}$	0.5	± 0.1	0.2	M2.5
3.2	7	$\begin{smallmatrix} +0 \\ -0.3 \end{smallmatrix}$	0.5	± 0.1	0.2	M3
(3.7)	8	$\begin{smallmatrix} +0 \\ -0.3 \end{smallmatrix}$	0.8	± 0.1	0.3	(M3.5)
4.3	9	$\begin{smallmatrix} +0 \\ -0.3 \end{smallmatrix}$	0.8	± 0.1	0.3	M4
(4.8)	10	$\begin{smallmatrix} +0 \\ -0.3 \end{smallmatrix}$	1.0	± 0.1	0.4	(M4.5)

(Continued)

NOTE — Sizes in brackets are of second preference.

*See IS : 919 - 1963 'Recommendations for limits and fits for engineering (revised)'.

TABLE 1 DIMENSIONS FOR MACHINED WASHERS — *Contd*

SIZE <i>d</i> H12*	<i>D</i>		<i>s</i>		<i>e</i> <i>Nom</i>	FOR BOLT OR SCREW SIZE
	Basic	Tol	Basic	Tol		
5.3	10	$\begin{smallmatrix} +0 \\ -0.3 \end{smallmatrix}$	1.0	± 0.1	0.4	M5
6.4	12.5	$\begin{smallmatrix} +0 \\ -0.4 \end{smallmatrix}$	1.6	± 0.2	0.6	M6
(7.4)	14	$\begin{smallmatrix} +0 \\ -0.4 \end{smallmatrix}$	1.6	± 0.2	0.6	(M7)
8.4	17	$\begin{smallmatrix} +0 \\ -0.4 \end{smallmatrix}$	1.6	± 0.2	0.6	M8
10.5	21	$\begin{smallmatrix} +0 \\ -0.5 \end{smallmatrix}$	2	± 0.2	0.6	M10
13	24	$\begin{smallmatrix} +0 \\ -0.5 \end{smallmatrix}$	2.5	± 0.3	0.6	M12
(15)	28	$\begin{smallmatrix} +0 \\ -0.5 \end{smallmatrix}$	2.5	± 0.3	0.6	(M14)
17	30	$\begin{smallmatrix} +0 \\ -0.5 \end{smallmatrix}$	3	± 0.3	0.6	M16
(19)	34	$\begin{smallmatrix} +0 \\ -0.8 \end{smallmatrix}$	3	± 0.3	1.0	(M18)
21	37	$\begin{smallmatrix} +0 \\ -0.8 \end{smallmatrix}$	3	± 0.3	1.0	M20
(23)	39	$\begin{smallmatrix} +0 \\ -0.8 \end{smallmatrix}$	3	± 0.3	1.0	M22
25	44	$\begin{smallmatrix} +0 \\ -0.8 \end{smallmatrix}$	4	± 0.3	1.0	M24
(28)	50	$\begin{smallmatrix} +0 \\ -0.8 \end{smallmatrix}$	4	± 0.3	1.0	(M27)
31	56	$\begin{smallmatrix} +0 \\ -1.0 \end{smallmatrix}$	4	± 0.3	1.0	M30

(Continued)

Note — Sizes in brackets are of second preference.

*See IS : 919-1963 'Recommendations for limits and fits for engineering (revised)'.

TABLE 1 DIMENSIONS FOR MACHINED WASHERS — *Contd*

SIZE <i>d</i> H12*	<i>D</i>		<i>s</i>		<i>Nom</i>	FOR BOLT OR SCREW SIZE
	Basic	Tol	Basic	Tol		
(34)	60	+0 -1.0	5	±0.6	1.0	(M33)
37	66	+0 -1.0	5	±0.6	1.6	M36
(40)	72	+0 -1.0	6	±0.6	1.6	(M39)
43	78	+0 -1.0	7	±1.0	1.6	M42
(46)	85	+0 -1.5	7	±1.0	1.6	(M45)
50	92	+0 -1.5	8	±1.0	1.6	M48
(54)	98	+0 -1.5	8	±1.0	1.6	(M52)
58	105	+0 -1.5	9	±1.0	1.6	M56
(62)	110	+0 -1.5	9	±1.0	2.0	(M60)
66	115	+0 -1.5	9	±1.0	2.0	M64
(70)	120	+0 -1.5	10	±1.0	2.0	(M68)
74	125	+0 -1.8	10	±1.0	2.0	M72
(78)	135	+0 -1.8	10	±1.0	2.5	(M76)

(*Continued*)

NOTE — Sizes in brackets are of second preference.

*See IS : 919 - 1963 'Recommendations for limits and fits for engineering (revised) '.

TABLE 1 DIMENSIONS FOR MACHINED WASHERS — *Contd*

SIZE <i>d</i> H12*	<i>D</i>		<i>s</i>		<i>e</i> <i>Nom</i>	FOR BOLT OR SCREW SIZE
	Basic	Tol	Basic	Tol		
82	140	+0 -1.8	12	±1.2	2.5	M80
(87)	145	+0 -1.8	12	±1.2	2.5	(M85)
93	160	+0 -1.8	12	±1.2	3.0	M90
(98)	165	+0 -1.8	12	±1.2	3.0	(M95)
104	175	+0 -1.8	14	±1.2	3.0	M100
(109)	180	+0 -1.8	14	±1.2	3.0	(M105)
114	185	+0 -2	14	±1.2	3.0	M110
(119)	200	+0 -2	14	±1.2	3.0	(M115)
(124)	210	+0 -2	16	±1.2	3.0	(M120)
129	220	+0 -2	16	±1.2	3.0	M125
(134)	230	+0 -2	16	±1.2	3.0	(M130)
144	240	+0 -2	18	±1.2	4.0	M140
(155)	250	+0 -2	18	±1.2	4.0	(M150)

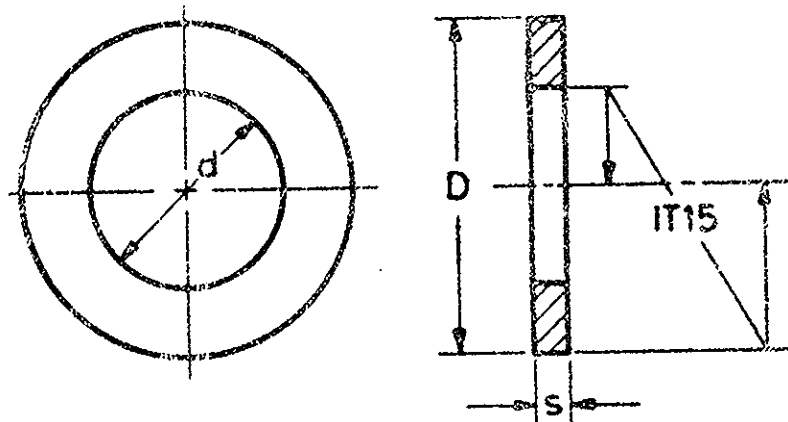
NOTE — Sizes in brackets are of second preference.

*See IS : 919 - 1963 'Recommendations for limits and fits for engineering (revised)'.

**TABLE 2 DIMENSIONS FOR PUNCHED WASHERS, TYPE A,
FOR HEXAGONAL BOLTS AND SCREWS**

(Clauses 4.1 and 4.2)

All dimensions in millimetres.



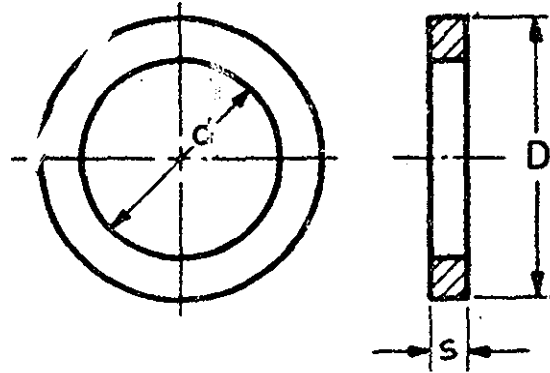
SIZE <i>d</i>	<i>D</i> Nom	<i>s</i> Nom	FOR BOLT OR SCREW SIZE
1.8	4	0.4	M1.6
(2.1)	5	0.4	(M1.8)
2.4	5	0.4	M2
(2.6)	6	0.5	(M2.2)
2.9	6.5	0.5	M2.5
3.4	7	0.5	M3
(4.0)	8	0.8	(M3.5)
4.5	9	0.8	M4
(5.0)	10	1	(M4.5)
5.5	10	1	M5
6.6	12.5	1.6	M6
(7.6)	14	1.6	(M7)
9	17	1.6	M8
11	21	2	M10
14	24	2.5	M12
(16)	28	2.5	(M14)
18	30	3.15	M16
(20)	34	3.15	(M18)
22	37	3.15	M20
(24)	39	3.15	(M22)
26	44	4	M24
(30)	50	4	(M27)
32	56	4	M30
(36)	60	5	(M33)
39	66	5	M36
(42)	72	6	(M39)
45	78	6	M42
(48)	85	8	(M45)
52	92	8	M48

NOTE — Sizes in brackets are of second preference.

**TABLE 3 DIMENSIONS FOR PUNCHED WASHERS, TYPE B,
FOR ROUND AND CHEESE HEAD SCREWS**

(Cl uses 4.1 and 4.2)

All dimensions in millimetres.



Size <i>d</i>	<i>D</i> Nom	<i>s</i> Nom	FOR SCREW SIZE
1.8 (2.1) 2.4	3.5 3.5 4.5	0.4 0.4 0.4	M1.6 (M1.8) M2
(2.6) 2.9 3.4	4.5 5.0 6.0	0.5 0.5 0.5	(M2.2) M2.5 M3
(4.0) 4.5 (5.0)	7.0 8.0 9.0	0.5 0.8 0.8	(M3.5) M4 (M4.5)
5.5 6.6 (7.6)	9.5 11 13	1.0 1.6 1.6	M5 M6 (M7)
9 11 14	14 18 20	1.6 2 2.5	M8 M10 M12
(16) 18 (20)	24 27 30	2.5 3.15 3.15	(M14) M16 (M18)
22	33	3.15	M20

NOTE — Sizes in brackets are of second preference.

AMENDMENT NO. 2 MARCH 1979
TO
IS : 2016-1967 SPECIFICATION FOR
PLAIN WASHERS
(First Revision)

Alterations

[Page 4, clause 4.2 (see also Amendment No. 1) — Substitute the following for the existing clause:

‘4.2 The other dimensional requirements for punched washers covered in Tables 2 and 3 shall comply with those specified for ordinary washers according to IS : 5369-1975*.’

(Page 4, foot-note with ‘ * ’ mark) — Substitute the following for the existing foot-note:

‘*General requirements for plain washers and lock washers (first revision).’

(Page 5, clauses 6 and 6.1) — Substitute the following for the existing clauses:

‘6. GENERAL REQUIREMENTS

6.1 In respect of requirements not covered in this standard, machined and punched washers shall comply with requirements specified for precision and ordinary washers, respectively, according to IS : 5369-1975*.’

Addendum

(Page 5, foot-note) — Add the following new foot-note at the end:

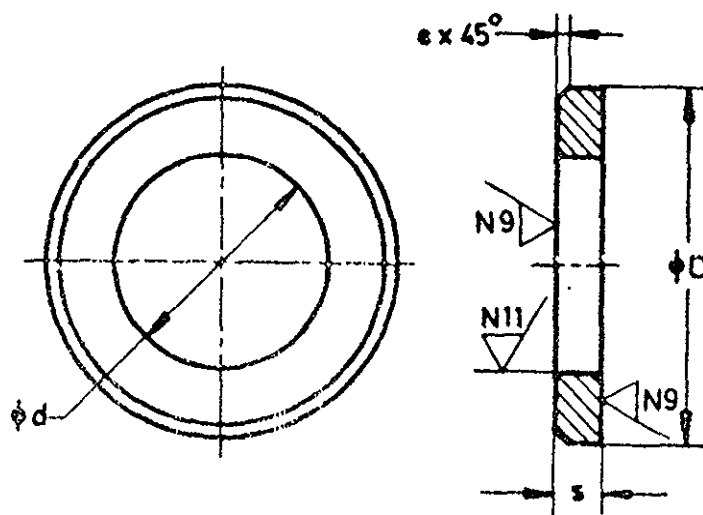
‘*General requirements for plain washers and lock washers (first revision).’

AMENDMENT NO. 3 NOVEMBER 1980
TO
IS:2016-1967 SPECIFICATION FOR PLAIN WASHERS

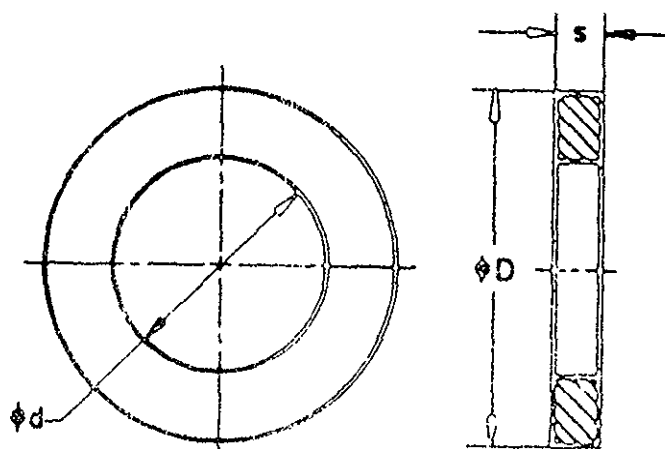
(First Revision)

Alterations

(Page 6, Table 1, figure) - Substitute the following for the existing figure:



(Page 10, Table 2, figure) - Substitute the following for the existing figure:



Addendum

(Page 4, clause 4.2) - Add the following new clause after 4.2:

"4.3 Machined and punched washers shall conform to the concentricity tolerance, permissible deviations for parallelism and flatness as specified in IS:5369-1975 'General requirements for plain washers and lock washers (first revision)'."

(EDC 27)

AMENDMENT NO. 4 OCTOBER 1982
TO
IS:2016-1967 SPECIFICATION FOR PLAIN WASHERS
(First Revision)

Alterations

[Page 4, clause 4.2 (see also Amendment No. 2)] -
Substitute the following for the existing clause:

"4.2 The tolerance on inner diameter, d outer diameter, D and thickness s for machined and punched washers shall conform to precision and ordinary washers respectively as specified in IS:5369-1975 'General Requirements for Plain Washers and Lock Washers'."

[Page 4, clause 4.3 (see also Amendment No. 3)] -
Substitute the following for the existing clause:

"4.3 In respect of concentricity tolerance, permissible deviations for parallelism and flatness, the machined and punched washers shall conform to precision and ordinary washers respectively as specified in IS:5369-1975."

(Pages 6 to 9, Table 1):

- a) First column heading - Delete 'H12*'.
b) Columns under 'D' and 's' - Delete.
c) Foot-note with '*' mark - Delete.

(EDC 27)